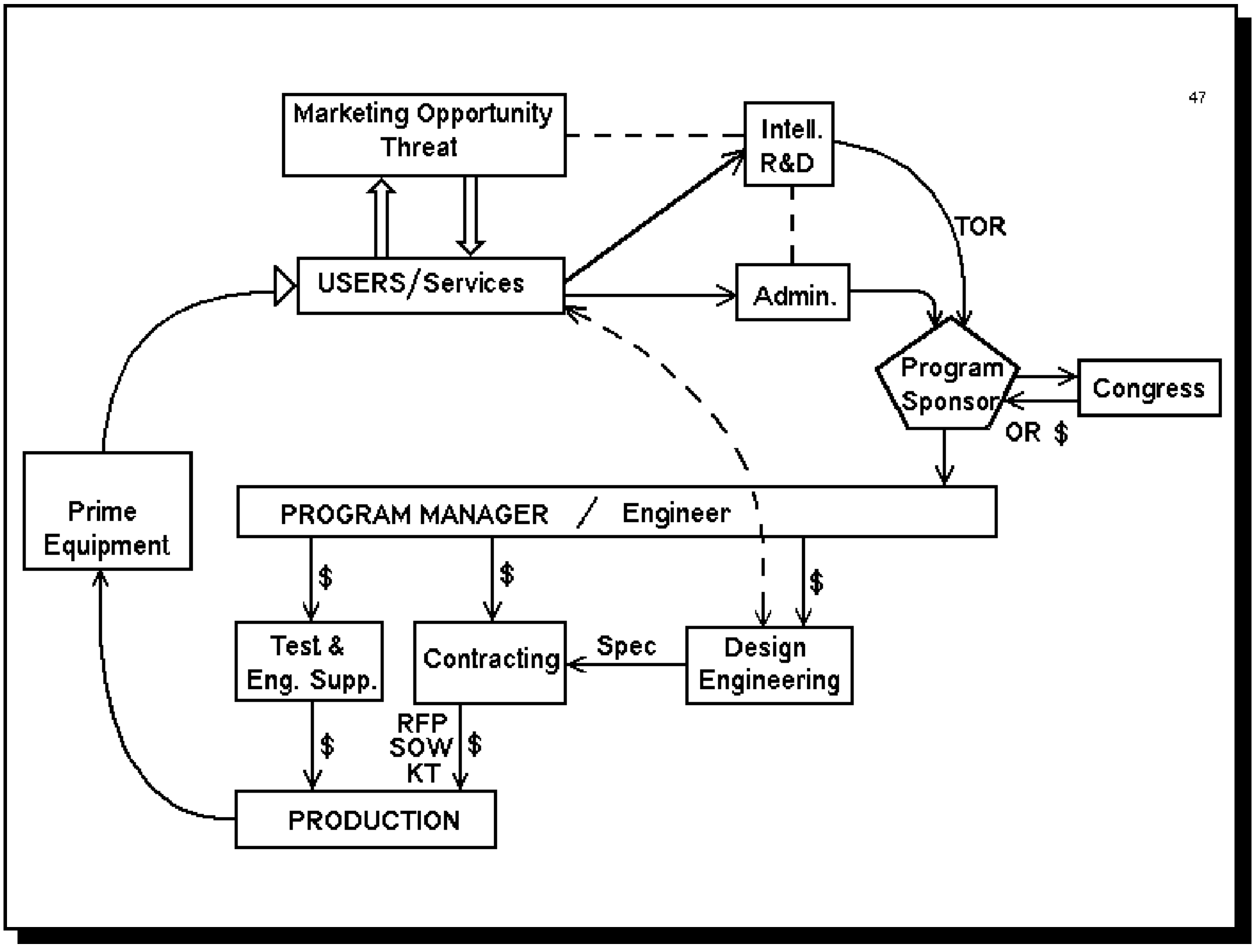
INTEGRATED LOGISTICS SUPPORT (ILS) OVERVIEW; by Chuck Sproull 7/97

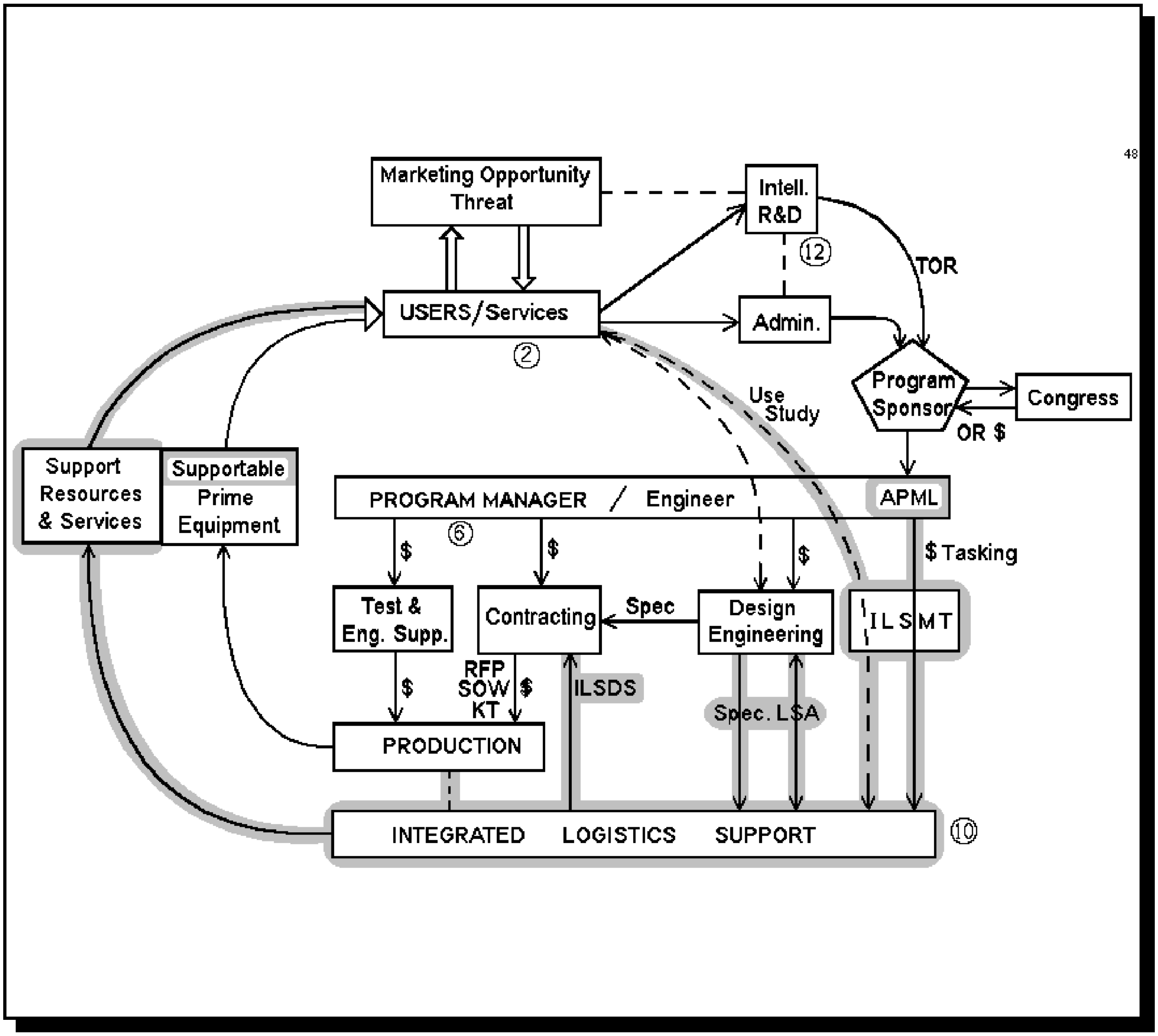
47. Finally, here is the complete big picture of program or corporate management - like a large 5-10 year cycle beginning and ending with the user of the system or equipment. This is only a brief summary of one of many variations of the acquisition cycle. In the military, requirements begin either when: (1) an enemy develops a greater threat (which could be a greater offensive capability or a more effective defense or counter-measure against one our defense capabilities). (2) Or a requirement could be generated by defense or commercial industry developing a new technology or piece of equipment that can do something faster and better, that would give our troops a better defensive capability. Then, intelligence personnel who study threats, and the research and development personnel who study new technology get together with representatives of the users of that type of weapon system, along with staff personnel from their upper level management, and write a Tentative Operational Requirement that briefly explains what the new equipment needs to do. This is a lot like the new product development and marketing studies done by commercial industry.

The appropriate service Chiefs of Staff then attempt to sell Congress on the idea of developing a needed capability or technology into new military systems and equipment. If Congress agrees, they make a new line item in their budget, and send the Operational Requirement and funding to the service secretary and sponsors (like SECNAV and CNO). The sponsors assign a Systems Command Program Manager to manage the development and production of equipment that will perform this needed capability. The program manager then organizes a team of assistant managers and specialists from the systems command, support contractors and field activities and industry (as in an earlier Vu-Graph). The PM begins the process of sending out funded tasking statements and then manages the program in order to get all the work done in the right order to turn the requirement into an actual hardware system, submitting periodic budget adjustments and giving briefings to his sponsors on his progress.

Design engineers, technical writers and drafting develop a performance specification and engineering drawings (either on paper or by computer). Contract specialists write a statement of work which, when combined with the drawings and specification, is used as a contract for competitive or sole source procurement from a manufacturer. Usually, prototype units are built first according to the drawings and tested under ideal circumstances either by a military field laboratory or by the manufacturer, to see if its performance meets the requirements in the specifications. Then units are tested in various simulated environments where the equipment may be used (like salt fog, sunlight, dust, fungus, heat, cold, vacuum, pressure, electromagnetic and radio frequency interference, shock and vibration and accelerated aging). Sometimes computer simulated prototype testing is conducted on 3-D computer drawings in what is called "virtual environments." If the proposed system design doesn't perform according to the requirement, the design is changed (improved) and new drawings are made, new prototypes are made, and it is retested. If it works OK, then it is exposed to operational testing to see if it works OK in the real operational environment. If it still works OK, it is approved by the sponsors for production. It is produced and tested again, both during manufacturing as QA testing and after as production lot sample testing. Finally, the system or equipment is sent to the users and they can begin using it.

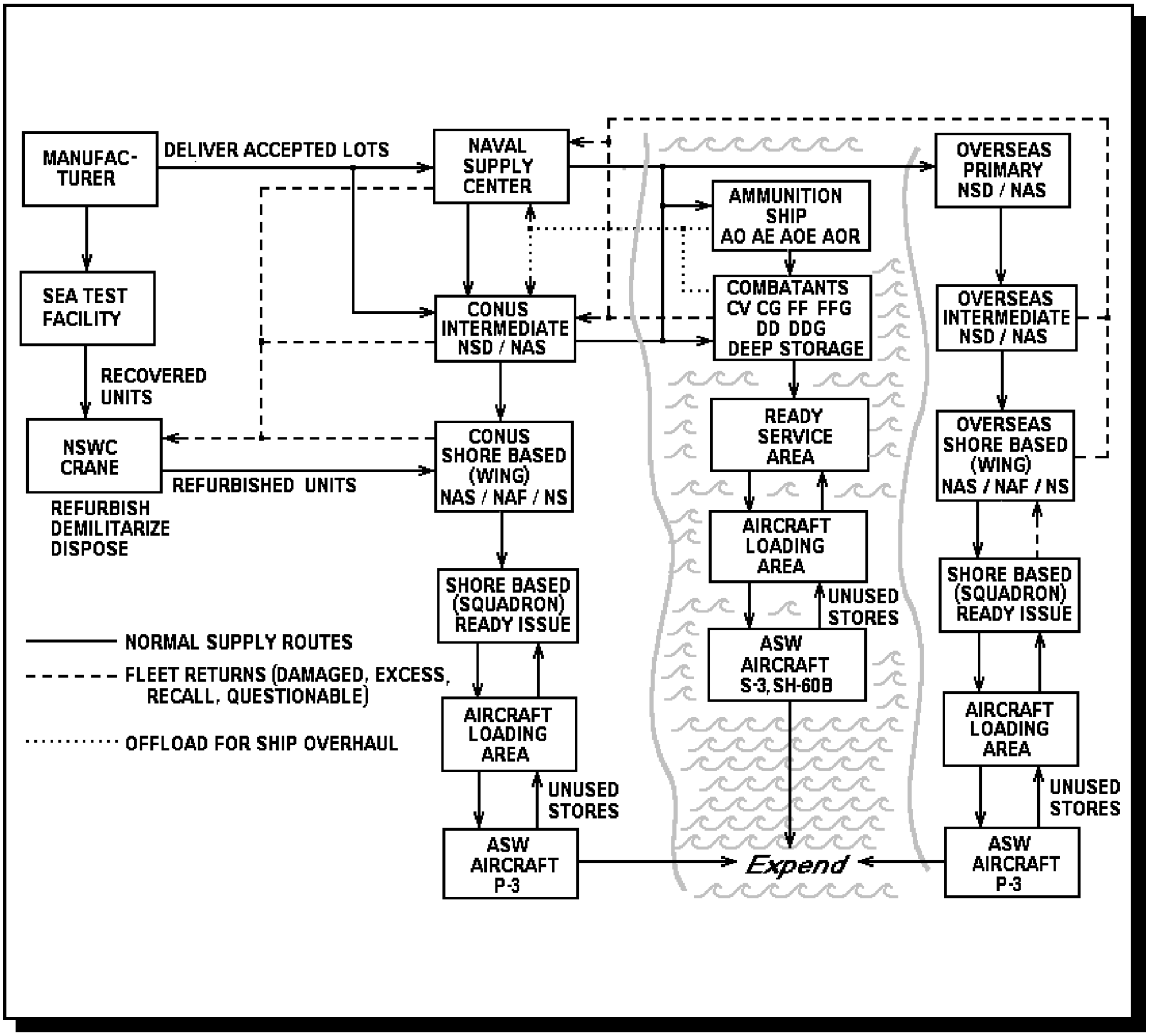


48. Up until about 20 years ago, many military and commercial programs followed this basic evolution of operational requirements. Along with this cycle is the more recently developed concentric cycle of support requirements. The Operational Requirement now contains statements about system support as well as performance. Many program managers now have an assistant PM for logistics to organize a team of technical specialists in all the appropriate logistics elements. They team up with the engineers and together they begin the systems and support engineering process. An important part of this process is Logistics Support Analysis (LSA), which will be described on more detail later. As a result of LSA, they develop an ILS Detail Specification that is added to the contract, describes how to make the new system supportable, and lists the ILS support resources (test equipment, spare parts, parts lists, operation and maintenance manuals, other data and information the PM needs to buy along with the prime equipment). These and other ILS resources may also be developed by field activities. Along with developmental testing, operational testing is done to determine if the new system can be used and supported in its intended operational environment (like on a ship, in an aircraft, in the desert, in space, or under water). Finally, a brand new completely operational and supportable system is delivered to the user and hopefully they are perfectly satisfied.



(Circled numbers are the years I spent in each type of occupation)

49. Here is a very useful ILS graphics tool - a map or chart that shows all locations of product manufacturers, test and storage facilities, user locations, and maintenance facilities, and all transportation routes between these locations. Using this one tool, it is possible to determine what types of support and test equipment, personnel and technical documentation are required at each location, and to plan ahead for each of the various ILS elements individually and then cumulatively, to determine total support requirements. Also, along with transportation routes, there are different transportation systems (rail, air, truck) that have different size and weight capacities and limitations (like bridges and tunnels) and priorities that need to be considered. This chart shows distribution of expendable sonobuoys from land based manufacturers to shore based and at-sea storage and user locations.



Another useful tool is a technical manual update schedule. There were many different types of sonobuoys. Occasionally one would be changed to improve operation, or a new one would be produced. So the users had to be kept informed about the technical characteristics and uses of these items. There are several kinds of operator and storage manuals for sonobuoys. In addition, sonobuoys are deployed (air-launched) from 5 different kinds of navy aircraft (2 airplanes and 3 helicopters), each having its own ordnance loading manual. These manuals have different update schedules and different personnel and field activities are involved with updating them. After the update process for each document was charted out on a schedule, and points of contact were determined, it was easy to submit new sonobuoy information to be included in the next revision of each document.

50. Remember our earlier discussion on related programs, where we saw the importance of tracking the effects of ECPs (Engineering Change Proposal) through the ILS elements for life cycle cost effectiveness? Here is the result a study that was conducted to track the effects of an ECP through the PHS&T element.

The inside dimensions of a high-cube semi-trailer are 50' long, by 97" wide by 110" high (with a 93" x 105" door opening). Comparison with the dimensions of a standard wooden pallet (36"x 36"x 45" high) reveals that a full load could consist of 2 x 2 x 16 pallets or maximum of 64.

PALLET DIMENSIONS 50

PALLET TYPE	Length (inch)	Width (inch)	Stacking: Height (inch)	Area (ft^2)	Cubes (ft^3)
36-UNIT BB - Wood	36	36	45	9	33.8
(6"x6" Overpacks)	44	**50**	**52**	15.3	66.2
LCS 55-UNIT BB	46.5	40	51	12.9	54.9
(with CAD)	46.5	40	**57**	12.9	61.3
MK 121 METAL FRAME PALLET	**48**	41	38	13.6	43.3

SEMI TRAILER (max)		
LENGTH	50ft	
DOOR W x H	93"	104"
INSIDE W x H	**97"**	**110"**
HALF W x H	**48.5"**	**55"**
(TOTAL HEIGHT)		(13'6")

LOADING				
PALLETS PER ROW	16	16	16	16
HIGH (+**55**")	2	2	1	1
WIDE (+**48**")	x 2	1	2	1
TOTAL PALLETS	64	32	32	16

Sonobuoys are made with a standard diameter so they will fit standard Sonobuoy Launch Containers (SLC), which fit in protective plastic outer packs and in sonobuoy launchers aboard the aircraft. Since the Cartridge Actuated Devices (CAD), used to launch sonobuoys are classified as "Explosives," they are packaged, transported and stored separately and inserted into the end of the sonobuoy just prior to loading on the aircraft. There are some inefficiencies in this operation. At one time, and for a particular type of sonobuoy (3 low cost buoys per SLC), we had considered the possibility of inserting the CADs into the SLCs at the manufacturer's plant, and transporting and storing them together. While this could have lead to some efficiencies in operations, it also added 6" (2" per unit) to pallet height. Upon tracking this ECP impact through the support elements, we found that the stacking height of two pallets would be too high for the semi-trailer inside dimension, and therefore a full load would consist of only 32 pallets. This would require more use of wood for extra blocking and bracing, would have doubled transportation costs and would have caused inefficiencies in land based and shipboard storage due to the requirement of segregating units containing explosive CADs from those without CADs.

To Further emphasize the sensitivity of transportation and storage to unit dimensions, suppose an ECP were submitted that added more capability but increased the product's diameter by 1". What impacts would this have? Since they are palletized 36 per pallet (that is 6 x 6 for a pallet width of 44"), a 1" increase per unit would add up to a 6" increase in pallet width, or 12" for two pallets, for a total width of 100", which is too wide for loading two side-by-side on a semi-trailer. They would only be able load 32 pallets. So again transportation costs would double. Furthermore, the increased pallet dimensions would cause stacking inefficiencies and additional costs at storage facilities. Another option would be to palletize them 5 x 5, which would allow for a full truck load 64 pallets, but the quantity of units per load would be reduced by about 30%. Considering Design Interface element, another cost impact would be the ECP to the launcher in the aircraft, to increase the inside dimension by 1".